Risk based surveillance of vector born infections - the daily transmission potential of Schmallenberg in Denmark 2013 to 2016

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NKVet Symposium

2017

Control- and surveillance programs for health and welfare in production animals

NK Vet

Nordic Committee for Veterinary Scientific Cooperation

Program

Wednesday 11.01.2017
09:00 – 10:00 Registration

10:00 Welcome – Tore Tollersrud

10:15 – 12:00 Current surveillance programs in animal health and welfare in the Nordic countries. Moderator: Pia Vennerström
10:15 – 10:45: "Monitoring animal health today and future perspectives", Petter Hopp
10:45 – 11:00: "Surveillance for Chronic Wasting Disease in cervids in Norway", Ståle Sviland
11:00 – 11:30: "Monitoring animal welfare today and future perspectives", Linda Keeling and co-authors Jan Hultgren and Harry Blokhuis
11:30 – 11:50: "Syndromic surveillance", Fernanda Dórea
11:50 – 12:00: Questions and views

12:00 – 13:00 Lunch and posters

13:00 – 14:30 The role of the industry vs. the authorities – cooperation or competition? Moderator: Tore Tollersrud
13:00 – 13:45: "Understanding roles - to have the same goal and different hats", Kristina Landsverk
13:45 – 14:00: Questions and views
14:00 – 14:30: "Animal Welfare regulations", Frida Lundmark and co-author Lotta Berg

14:30 – 15:00 Coffee break

15:00 – 15:45 Authorities vs industry continues
15:00 – 15:20: "Consumers preferences and the marketing of good animal welfare" Marianne Kulø
15:20 – 15:45: Discussion – panel debate

15:45 – 16:00: Break

16:00 – 17:00 KOORIMP 20 år, vi feirer risikohåndtering i praksis. Moderator: Nina Svendsby
16:00 – 16:20: "Starten", Trygve Grøndalen (gründer)
16:20 – 16:40: "Det nordiske samarbeidet" Hannele Nauholz
16:40 – 17:00: "Risikovurdering import av storfe fra 7 land", Tormod Mørk

17:00 – 17:30: Celebration with bubbling drinks

19:00 - 23:00 Dinner
På Olympen Restaurant, www.olympen.no

Thursday 12.01.2017

09:00 – 10:00 New methods of surveillance. Moderator: Petter Hopp

09:00 – 09:40: "Efficient methods, health and welfare", Jenny Frössling

09:40 – 10:15: "Ongoing animal health and welfare projects – Nordic and arctic veterinary authority collaboration", Thora Jónasdottir

10:15 – 10:40: Coffee break

10:40 – 12:30 New Methods continues

10:40 – 11:00: "Passive surveillance of VHS genotype Id in brackish water rainbow trout farms was superior to active surveillance", Pia Vennerström

11:00 – 11:20: "Optimising targeted surveillance for bovine virus diarrhoea", Malin Jonsson

11:20 – 11:40: "Big data - modelling of midges in Europa by machine learning", Lene Jung Kjær

11:40 – 12:00: "Assessment of animal welfare in broiler flocks", Randi Oppermann Moe and co-authors Guro Vasdal and Erik Granquist

12:00 – 12:30: Panel debate

12:30 – 13:30 Lunch

13:30 – 15:00 "One health" Moderator: Lotta Berg

13:30 – 14:00: "One health, utilization of data for improved lives in humans and animals", Yngvild Wasteson

14:00 – 14:20: "Risk based surveillance of vector borne infections", Rene Bødker

14:20 – 14:40: "MRSA Research in Denmark – a close collaboration between the animal and human side", Professor Karl Pedersen

14:40 – 15:00: MRSA – surveillance and control in Norway, Carl Andreas Grøntvedt

15:00 – 15:15: Questions and closing comments

Risk based surveillance of vector borne infections - the daily transmission potential of Schmallenberg in Denmark 2013 to 2016

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Denmark started a surveillance program for biting midges in 2013. The program monitors the weekly abundance of biting midges on three selected cattle farms. The vector abundance is weekly updated on www.myggetal.dk. The abundance of biting Obsoletus midges on the three cattle farms varies dramatically with peak periods observed in the months of May, July, and late September. Between these population peaks there can be weeks of very low abundance of biting midges. Additional to the 'within year variation' there is also a very large 'year to year variation' in the population pattern. It is not clear what determines the population dynamics of the biting midges. Until a population model for vector abundance is developed the present active vector surveillance is the only way to obtain reliable dynamic abundance data.

Vector abundance is a key driver of the transmission potential of a vector borne disease. Because of the cold Scandinavian climate the transmission season is short and good estimates of the seasonal transmission potential can therefore be used to optimize the timing of disease surveillance in livestock. Precisely defining the start and the end of the transmission season for a specific vector borne infection in a specific year may allow us to target national serological surveillance soon after the potential transmission season has ceased. Optimizing the timing of serological surveys on farms allows rapid free testing for export purposes and can also dramatically reduce the number of the costly serological samples needed – known as 'targeted surveillance'. Precisely defining the start and the end of the transmission season may furthermore guide veterinarians to choose the best diagnostic tests when presented with clinically sick animals. Therefore, knowing if the period where a sick animal is presented is a potential high risk period can increase the probability of early detection of exotic diseases in a country.

Considerable effort has been put in surveillance of biting midges in Europe and this is to predict risk of Culicoides borne infections like Bluetongue and Schmallenberg virus in ruminants. But we found a relatively poor correlation between vector abundance on a specific day and the risk of disease transmission for that day. Additionally we found a very poor correlation between vector abundance on a specific day and potential clinical illness for that day. This suggests that vector abundance alone is a relatively poor criterion for diagnostic decision making. We developed a mathematical process model for estimating the daily transmission potential. Based on the daily vector abundance and the temperature the model predicts the relative potential for clinical illness on a given day based on the cumulative transmission potential in the preceding month while assuming a uniform risk of introduction. The model also predicts the potential future transmission risk (the R0) following an introduction of an infectious host on that given day.

Despite high abundance of Obsoletus midges in May the temperatures were too low to allow for transmission of Schmallenberg virus. But during the summer period the vector abundance was a good predictor of the R0 following an introduction of an infective host. However the daily vector abundance was often very low when the transmission and disease risk were at the highest. This was because the peak of transmission from vectors to new hosts was often delayed by two or more weeks after the peak of transmission from hosts to vectors. Therefore, clinical disease occurred well after the vector populations peaked, making the daily vector abundance a poor predictor of disease incidence risk; unless the vector abundance was first processed in a mathematical model which is able to handle these delays.